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Scientists Alarmed by the Rapid Spread of Brown Streak Disease in Cassava, a Crop that Sustains 300 Million Africans

World's cassava experts to wage war against cassava viruses;
Introduction into Nigeria, the largest cassava producer in the world, could result in drastic food shortages in this part of Africa

BELLAGIO, ITALY (6 MAY 2013)— Cassava experts are reporting new outbreaks and the increased spread of Cassava Brown Streak Disease or CBSD, warning that the rapidly proliferating plant virus could cause a 50 percent drop in production of a crop that provides a significant source of food and income for 300 million Africans.

The "pandemic" of CBSD now underway is particularly worrisome because agriculture experts have been looking to the otherwise resilient cassava plant—which is also used to produce starch, flour, biofuel and even beer—as the perfect crop for helping to feed a continent where growing conditions in many regions are deteriorating in the face of climate change.

"Cassava is already incredibly important for Africa and is poised to play an even bigger role in the future, which is why we need to move quickly to contain and eliminate this plague," said Claude Fauquet, a scientist at the International Center for Tropical Agriculture (known by its Spanish acronym CIAT) who heads the Global Cassava Partnership for the 21st Century (GCP21). "We are particularly concerned that the disease could spread to West Africa and particularly Nigeria—the world's largest producer and consumer of cassava—because Nigeria would provide a gateway for an invasion of West Africa where about 150 million people depend on the crop."

Fauquet and his colleagues in the GCP21—an alliance of scientists, developers, donors and industry representatives—are gathering at the Rockefeller Foundation Bellagio Center in Italy this week for a conference dedicated to "declaring war on cassava viruses in Africa."

A "Silent Killer" Emerges: CBSD on Warpath from East to West

First identified in 1935 in East Africa and little-known until about ten years ago, CBSD has emerged as the most serious threat among the various cassava viruses. Infections can claim 100 percent of a farmer's harvest without the farmer's knowledge. The leaves of infected plants can look healthy even as the roots, cassava's most prized asset, are being ravaged underground. The tell-tale signs of the disease are brown streaks in the root's flesh that, when healthy, provides a rich source of dietary carbohydrates and industrial starchy products.

There have been recent reports of new outbreaks in the Democratic Republic of the Congo—the world's third largest cassava producer—and Angola, where production has boomed in recent years. The spread of the disease to West Africa and particularly Nigeria is a major cause for concern, experts say, because the country now produces 50 million tons of cassava each year and has made a big bet on cassava for its agricultural and industrial development in the near future.

Nigeria is the first African country to massively invest in the potential of cassava to meet the rapidly growing global demand for industrial starches, which are used in everything from food products to textiles,

plywood and paper. Nigeria hopes to mimic the success of countries in Southeast Asia, where a cassava-driven starch industry now generates US$5 billion per year and employs millions of smallholder farmers and numerous small-scale processors.

CMD—a Scourge for Cassava on the African Continent

Scientists at the conference will also consider options for dealing with another devastating virus—the Cassava Mosaic Disease (CMD). CMD has plagued the whole African continent for over a century, each year removing a minimum of 50 million tons of cassava from the harvest.

The disease is caused by several viruses and the African continent witnessed several major CMD epidemics over the past decades, the most recent and devastating of which occurred in the 1990s in East and Central Africa. Great success was achieved in combating the CMD pandemic through developing and disseminating varieties that were resistant to CMD. In fact, by the mid-2000s, half of all cassava farmers were benefiting from these varieties in large parts of East and Central Africa. But by a cruel twist of nature, both improved and local varieties all succumbed to the 'new' pandemic of CBSD.

Unexpected Plot Twist: Whiteflies Ambush a Climate-Resilient Crop

Interest in cassava has intensified across Africa as rising temperatures and shifting rainfall patterns caused by climate change threaten the future viability of food staples such as maize and wheat. Cassava has been called the "Rambo root" for its extraordinary ability to survive high temperatures and tolerate poor soils. But rising temperatures now pose a threat to cassava because they appear to be one of several factors causing an explosion in whiteflies, which carry the viruses that cause CMD and CBSD and pass it along as they feed on the plant's sap.

Compounding the effects of rising temperatures, scientists also think that genetic changes have led to the emergence of "super" whiteflies. This toxic mix of circumstances affecting a tiny fly threatens to shoot down the "Rambo root," bringing the misery of food insecurity to vast swathes of Africa.

"We used to see only three or four whiteflies per plant; now we're seeing thousands," said James Legg, a leading cassava expert at the International Institute of Tropical Agriculture (IITA). "You literally have a situation where human beings are competing for food—with whiteflies."

Farmers also help spread the disease by planting new fields with infected stem cuttings. Scientists note that while it would take several years for the disease to spread across the continent via whiteflies alone, infected stem cuttings could spark outbreaks in new areas overnight.

Experts to Develop Plan to Stop Viruses in their Tracks

At the Italy meeting, experts will discuss a variety of tactics for combating virus diseases, such as developing more disease-resistant varieties like those recently released in Tanzania. Efforts to breed high-yielding, disease-resistant plants suitable for Africa's various growing regions will involve going to South America, where cassava originated, and working with scientists to mine the cassava gene bank at CIAT in Colombia—the biggest repository of cassava cultivars in the world.

The expert team will also discuss a more ambitious plan: how to eradicate cassava viruses altogether. The aim will be to develop a bold regional strategy that will gradually, step-by-step, village-by-village, replace farmers' existing infested cassava plants with virus-free planting material of the best and most resistant available cultivars. Approaches will include new molecular breeding and genetic engineering technologies to speed up the selection and production of CMD and CBSD resistant cassava cultivars more appealing to farmers.

There also will be discussions about cost-effective and environmentally sustainable ways to control whiteflies, as well as proposals for new surveillance systems that can better track and stop the disease

from spreading. Scientists will also discuss new research into the potential threat African cassava producers face from the introduction of new diseases currently found outside the continent.

"It's time for the world to recalibrate its scientific priorities," Fauquet said. "More than any other crop, cassava has the greatest potential to reduce hunger and poverty in Africa, but CBSD and other viruses are crippling yields. We need to treat CBSD and other destructive viruses like the smallpox of cassava—formidable diseases, but threats we can eradicate if everyone pulls together."

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Founded in 2003, the **Global Cassava Partnership for the 21st Century (GCP21)** is a not-for-profit international alliance of 45 organizations and coordinated by Claude Fauquet and Joe Tohme of the International Center for Tropical Agriculture (CIAT). It aims to fill gaps in cassava research and development in order to unlock the potential of cassava for improving food security and also increasing incomes of poor farmers through work to develop industrial products from cassava. GCP21 is providing updated information regarding the crop, the scientists working on cassava and cassava R&D projects in the world.

The **International Center for Tropical Agriculture (CIAT)**—a member of the CGIAR Consortium—develops technologies, tools, and new knowledge that better enable farmers, especially smallholders, to make agriculture eco-efficient—that is, competitive and profitable as well as sustainable and resilient. Eco-efficient agriculture reduces hunger and poverty, improves human nutrition, and offers solutions to environmental degradation and climate change in the tropics. With headquarters near Cali, Colombia, CIAT conducts research for development in tropical regions of Latin America, Africa, and Asia. www.ciat.cgiar.org

The **International Institute of Tropical Agriculture (IITA)** is a nonprofit research-for-development organization that works with partners in Africa and beyond to tackle hunger and poverty by reducing producer and consumer risks, enhancing crop quality and productivity, and generating wealth from agriculture. IITA is a member of the CGIAR Consortium. www.iita.org

Additional Institutions attending the Third Strategic Meeting of the Global Cassava Partnership for the 21st Century, Bellagio, Italy:

International Potato Center (CIP), leader of CGIAR' Research Program on Roots, Tubers and Bananas (RTB); CGIAR Fund; Food and Agriculture Organization of the United Nations (FAO); International Fund for Agricultural Development (IFAD); World Bank; the African Development Bank (AfDB); United States Agency for International Development (USAID); Bill & Melinda Gates Foundation; Syngenta Foundation for Sustainable Agriculture; Catholic Relief Services (CRS); Kenya Agricultural Research Institute (KARI); Mikocheni Agricultural Research Institute (MARI), Tanzania; Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ), Germany; Natural Resources Institute (NRI), UK; Tel Aviv University, Israel; Institute of Resources Assessment (IRA), Tanzania; National Agricultural Crops Resources Research Institute (NACRRI), Uganda.